



Japanese Laid-open Patent Gazette No. Pyung 7-099394

Title of Invention : MOUNTING STRUCTURE FOR LIQUID CRYSTAL  
MODULE

Application no. : Pyung 7-099394

Date of Filing : 1993. 9. 29.

Date of publication : 1995. 11. 4.

Applicant : SHARP CORP.

Inventor : KOTANI MASANORI

RECEIVED  
APR -9 2001  
TC 2800 MAIL ROOM

**1. TITLE OF THE INVENTION**

**MOUNTING STRUCTURE FOR LIQUID CRYSTAL MODULE**

**2. ABSTRACT**

**[CONSTITUTION]**

The periphery of a liquid crystal module 1 having a liquid crystal display panel 2 is supported by a vessel 6 and the liquid crystal module is fixed to receivers 9 provided at four corners of the inner sidewall of a box-shaped chassis unit 8. Screws 11 for supporting the liquid crystal module 1 supported by the vessel 6 are provided at the substantial center portion of the sidewall of the chassis unit 8.

[EFFECT]

A deflecting deformation at the center portion of the side of the liquid crystal module 1 can be prevented when a liquid crystal monitor having the liquid crystal module 1 fixed to the chassis unit 8 is dropped, to thereby assure a good quality of the product.

### **3. CLAIM**

1. A mounting structure for a liquid crystal module wherein the periphery of the liquid crystal having a liquid crystal display panel is supported by the liquid crystal module frame and the liquid crystal module is fixed to receivers provided at four corners of the inner sidewall of a box-shaped chassis, said structure comprising:

a supporting member for supporting the liquid crystal module supported by the liquid crystal module frame being provided at the substantial center portion of the sidewall of said chassis.

2. The mounting structure for the liquid crystal module according to claim 1, wherein said supporting member includes a screw member inserted, via the sidewall of the chassis, into the liquid crystal module frame.

3. The mounting structure for the liquid crystal module according to claim 1, wherein said supporting member includes a receiving member

## PRIOR ART

As shown in Fig. 3 for explaining the present invention, a liquid crystal module 1 includes a liquid crystal display (LCD) panel 2 consisting of a liquid crystal layer, a glass substrate and a polarizer, etc., an electrical circuit (not shown) for transmitting a signal to the periphery of the LCD panel 2, a backlight mechanism 4 provided at the lower portion of the LCD panel 2 in such a manner to have a base plate 3 made from aluminum therebetween, an inverter circuit (not shown) for a backlight 5, and connecting terminals.

The above-mentioned liquid crystal module 1 is supported by a square-shaped frame member referred to as a vessel 6. In other words, as shown in Fig. 4(a) for explaining the present invention, the vessel 6 is provided with a nail 7 in which a portion of the side surface thereof perpendicular to the upper edge of the vessel 6 is cut away. As shown in Fig. 4(b), the liquid crystal module 1 is integral to the vessel 6 by bending the nail 7 in an inside direction at the lower side of the base plate 3.

An integrated structure of the liquid crystal module 1 and the vessel 6 is fixed to a box-shaped chassis unit 8 made from a metal plate or a resin material as shown in Fig. 8. More specifically, the integrated structure of the liquid crystal module 1 and the vessel 6 is fixed to the chassis unit 8 by providing receivers 9 at four corners of the inner sidewall of the chassis unit

provided to be supported and fixed to the inner sidewall of the chassis capable of supporting the liquid crystal module frame from the lower portion thereof.

4. The mounting structure for the liquid crystal module according to claim 1, wherein said supporting member includes an inner protrusion member provided to be supported and fixed to the inner sidewall of the chassis capable of supporting the liquid crystal module frame from the lower portion thereof.

5. The mounting structure for the liquid crystal module according to claim 1, wherein said supporting member includes a cut-away bending member made by cutting away a portion of the sidewall of the chassis capable of supporting the liquid crystal module frame from the lower portion thereof and bending it toward the inner side thereof.

#### **4. DETAILED DESCRIPTION OF THE INVENTION**

##### **TECHNICAL FIELD**

This invention relates to a mounting structure for a liquid crystal module wherein the periphery of a liquid crystal module having a liquid crystal display panel is supported by the liquid crystal module frame and the liquid crystal module is supported and fixed to receivers provided at four corners of the inner sidewall of a box-shaped chassis.

8, loading the integrated structure of the liquid crystal module 1 and the vessel 6 into the receivers 9 and then securing it into the receivers 9 by means of tacks 10.

Further, the inner side of the chassis unit 8 is provided with a power supply circuit for driving the liquid crystal module 1, an operating circuit and connecting terminals for delivering a signal from a computer, etc. The unit having such structure and function is generally called a liquid crystal monitor.

#### **PROBLEM TO BE SOLVED BY THE INVENTION**

However, the conventional mounting structure for the liquid crystal module has problems in that, since the vessel 6 is fixed to four receivers 9 provided at the chassis unit 8, a deflecting deformation may be generated at a portion of the liquid crystal module 1 and the vessel 6, that is, at the center portion of the side thereof having a weak strength as indicated by an arrow A in Fig. 8 when the liquid crystal monitor is dropped due to an inadvertent treatment upon transportation and shipment. For instance, according to a dropping experiment for a liquid crystal monitor consisting of a 14" large-size LCD panel 2, the four corners of the liquid crystal module 1 are relatively strong enough to be not deformed, but the center portion of the side of the liquid crystal module 1, particularly, the center portion of the longitudinal side thereof is liable to be deformed because an impact load upon dropping is transferred to it. Also, although a deformation of the

chassis unit 8 does raise no problem, a deformation of the liquid crystal module 1 causes a damage of the LCD panel 2.

The present invention is devised in consideration of the above—mentioned problems. Accordingly, it is an object of the present invention to provide a mounting structure for a liquid crystal module that is capable of preventing a deflecting deformation at the center portion of the side of the liquid crystal module when a liquid crystal monitor is dropped, thereby assuring a good quality of the product.

#### **MEANS FOR SOLVING THE PROBLEM**

In order to solve the above—mentioned problems, in a mounting structure for a liquid crystal module according to claim 1 wherein the periphery of the liquid crystal having a liquid crystal display panel is supported by the liquid crystal module frame and the liquid crystal module is fixed to receivers provided at four corners of the inner sidewall of a box—shaped chassis, a supporting member for supporting the liquid crystal module supported by the liquid crystal module frame being provided at the substantial center portion of the sidewall of said chassis.

In order to solve the above—mentioned problems, in a mounting structure for the liquid crystal module according to claim 2, said supporting member in the mounting structure for the liquid crystal module set forth in claim 1 includes a screw member inserted, via the sidewall of the chassis, into the

liquid crystal module frame.

In order to solve the above-mentioned problems, in a mounting structure for the liquid crystal module according to claim 3, said supporting member in the mounting structure for the liquid crystal module set forth in claim 1 includes a receiving member provided to be supported and fixed to the inner sidewall of the chassis capable of supporting the liquid crystal module frame from the lower portion thereof.

In order to solve the above-mentioned problems, in a mounting structure for the liquid crystal module according to claim 4, said supporting member in the mounting structure for the liquid crystal module set forth in claim 1 includes an inner protrusion member provided to be supported and fixed to the inner sidewall of the chassis capable of supporting the liquid crystal module frame from the lower portion thereof.

In order to solve the above-mentioned problems, in a mounting structure for the liquid crystal module according to claim 5, said supporting member in the mounting structure for the liquid crystal module set forth in claim 1 includes a cut-away bending member made by cutting away a portion of the sidewall of the chassis capable of supporting the liquid crystal module frame from the lower portion thereof and bending it toward the inner side thereof.

## **OPERATIONS**

According to the mounting structure according to claim 1, the integrated structure of the liquid crystal module having the LCD panel and the liquid crystal module frame is fixed by the receivers provided at four corners of the inner sidewall of the box-shaped chassis, and the substantial center portion of the side of the integrated structure of the liquid crystal module frame and the liquid crystal module is supported by the supporting member provided at the substantial center portion of the sidewall of the chassis.

As a result, the substantial center portion of the integrated structure of the liquid crystal module frame and the liquid crystal module is reinforced, so that a deflecting deformation at the center portion of the side of the liquid crystal module can be prevented when the liquid crystal monitor having the liquid crystal module fixed to the chassis is dropped, thereby assuring a good quality of the product.

According to the mounting structure according to claim 2, the substantial center portion of the integrated structure of the liquid crystal module frame and the liquid crystal module is supported and fixed by the screw member inserted, via the sidewall of the chassis, into the liquid crystal module frame.

Accordingly, the integrated structure of the liquid crystal module frame and the liquid crystal module can be certainly fixed to the chassis, so that a deflecting deformation at the center portion of the side of the liquid crystal



module can be prevented when the liquid crystal monitor having the liquid crystal module fixed to the chassis unit is dropped, thereby assuring a good quality of the product.

According to the mounting structure according to claim 3, the substantial center portion of the side in the integrated structure of the liquid crystal module frame and the liquid crystal module is supported from the lower portion of the liquid crystal module frame by the receiving member provided to be supported and fixed to the inner sidewall of the chassis.

Accordingly, the supporting member permits a simple structure. Also, a deflecting deformation at the center portion of the side of the liquid crystal module can be prevented when the liquid crystal monitor having the liquid crystal module fixed to the chassis unit is dropped, thereby assuring a good quality of the product.

According to the mounting structure according to claim 4, the substantial center portion of the side in the integrated structure of the liquid crystal module frame and the liquid crystal module is supported from the lower portion of the liquid crystal module frame by the inner protrusion member provided to be supported and fixed to the inner sidewall of the chassis.

Accordingly, the supporting member permits a simple structure. Also, a deflecting deformation at the center portion of the side of the liquid crystal module can be prevented when the liquid crystal monitor having the liquid

crystal module fixed to the chassis unit is dropped, thereby assuring a good quality of the product.

According to the mounting structure according to claim 5, the substantial center portion of the side in the integrated structure of the liquid crystal module frame and the liquid crystal module is supported from the lower portion of the liquid crystal module frame by the cut-away bending member formed by cutting away a portion of the sidewall of the chassis and bending it toward the inner side thereof.

Accordingly, a deflecting deformation at the center portion of the side of the liquid crystal module can be prevented when the liquid crystal monitor having the liquid crystal module fixed to the chassis unit is dropped, thereby assuring a good quality of the product.

In addition, the cut-away bending member can be formed by a treatment of the chassis, so that it is possible to avoid an increase in the number of components. Thus, a cost rise of the product can be prevented.

## **DESCRIPTION OF THE PREFERRED EMBODIMENT**

An embodiment of the present invention will be described with reference to Fig. 1 to Fig. 7 below.

As shown in Fig. 3, the liquid crystal module 1 according to the present

embodiment includes a liquid crystal display (LCD) panel 2 consisting of a liquid crystal layer, a glass substrate and a polarizer, etc., an electrical circuit (not shown) for transmitting a signal to the periphery of the LCD panel 2, a backlight mechanism 4 provided at the lower portion of the LCD panel 2 in such a manner to have a base plate 3 made from aluminum therebetween, an inverter circuit (not shown) for a backlight 5, and connecting terminals.

The above-mentioned liquid crystal module 1 is supported by a square-shaped frame member referred to as a vessel 6 which is a liquid crystal module frame. More specifically, as shown in Fig. 4(a), the vessel 6 is provided with nails 7 in which a portion of the side surface thereof perpendicular to the upper edge of the vessel 6 is cut away. As shown in Fig. 4(b), the liquid crystal module 1 is integral to the vessel 6 by bending the nails 7 in an inside direction at the lower side of the base plate 3. As shown in Fig. 1, two nails 7 are individually defined at the side surface of the longitudinal side and the side surface of the short side of the vessel 6.

An integrated structure of the liquid crystal module 1 and the vessel 6 is fixed to a box-shaped chassis unit 8 made from a metal plate or a resin material. More specifically, the integrated structure of the liquid crystal module 1 and the vessel 6 is fixed to the chassis unit 8 by providing receivers 9 at four corners of the inner sidewall of the chassis unit 8, loading the integrated structure of the liquid crystal module 1 and the vessel 6 into the receivers 9 and then securing it into the receivers 9 by

16 ...cut-away bend

3  
4  
2

means of tacks 10.

In the mounting structure for The liquid crystal module 1 according to the present embodiment, screws 11 which are supporting members and screw members for supporting the liquid crystal module 1 supported by the vessel 6 are provided at both longitudinal sides of the chassis unit 8.

Three screw-fixing holes 12 are individually provided at the upper portion of both longitudinal sidewalls of the chassis unit 8 while screw holes 13 corresponding to their locations are defined at the side surfaces of the vessel 6. The screw holes 13 are provided with screw grooves.

As shown in Fig. 2, the vessel 6 is supported by the screws 11 inserted into the screw holes 13 through the screw-fixing holes 12 from the outer side of the the chassis unit 8.

On the other hand, the inner side of the chassis unit 8 is provided with a power supply circuit for driving the liquid crystal module 1, an operating circuit and connecting terminals for delivering a signal from a computer, etc. The unit having such structure and function is generally called a liquid crystal monitor.

As described above, in the mounting structure for the liquid crystal module 1 according to the present embodiment, the integrated structure of the liquid crystal module 1 having the LCD panel 2 and the vessel 6 is fixed by

the receivers 9 provided at four corners of the inner sidewall of the box-shaped chassis unit 8 and the substantial center portion of the side of the integrated structure of the vessel 6, and the liquid crystal module 1 is supported by the screws 11 provided at the substantial center portion of the sidewall of the chassis unit 8.

As a result, the substantial center portion of the integrated structure of the vessel 6 and the liquid crystal module 1 is reinforced, so that a deflecting deformation at the center portion of the side of the liquid crystal module 1 can be prevented when the liquid crystal monitor having the liquid crystal module 1 fixed to the chassis unit is inadvertently dropped, for example, in the course of its transporting and shipment or when a large impact load exerts onto it, thereby assuring a good quality of the product.

Furthermore, in the mounting structure for the liquid crystal module according to the present embodiment, the screws 11 are used as supporting members, so that the substantial center portion of the integrated structure of the vessel 6 and the liquid crystal module 1 is supported and fixed by the screws 11 inserted, via the sidewall of the chassis unit 8, into the vessel 6.

Accordingly, the integrated structure of the vessel 6 and the liquid crystal module 1 can be certainly fixed to the chassis unit 8, so that a deflecting deformation at the center portion of the side of the liquid crystal module 1 can be prevented when the liquid crystal monitor having the liquid crystal

module 1 fixed to the chassis unit is inadvertently dropped, thereby assuring a good quality of the product.

The present invention is not limited to the above-mentioned embodiment, but can have various modifications within the scope of the present invention.

For instance, although the above-mentioned embodiment has used the screws 11 as supporting members, it is possible to use L-shaped angles 14 as the receivers that are supporting members as shown in Fig. 5.

The L-shaped angles 14 are provided at the bent traces of the nails 7 in which a portion of the side surface of the vessel 6 is cut away in such a manner to have a width allowing a desired space. When the integrated structure of the vessel 6 and the liquid crystal module 1 is fixed to the chassis unit 8, the flat sides of the L-shaped angles 14 is supported and fixed at the substantial center portion of the inner sidewall of the chassis unit 8 in such a manner to be in contact with the lower surface of the base plate 3 of the liquid crystal module 1.

Accordingly, since a load causing a deflecting deformation of the vessel 6 is transferred to the base plate 3 when the liquid crystal monitor having the liquid crystal module 1 fixed to the chassis unit 8 is dropped, the L-shaped angles 14 endure such a load such that they can act as means for reinforcing the vessel 6. As a result, a deflecting deformation at the center

of the side of the liquid crystal module 1 can be prevented, to thereby assure a good quality of the product.

In addition, the L-shaped angles 14 permit a simple structure and mounting and are capable of easily functioning as supporting members.

Furthermore, the supporting members may be made by pins 15 as inner protrusions provided to be supported and fixed to the sidewall of the chassis unit 8 capable of supporting the vessel 6 from the lower portion thereof as shown in Fig. 6.

For example, the pins 15 are provided in such a manner to be passed through from the outer side of the sidewall of the chassis unit 8 toward the inner side thereof and protruded from the inner side thereof. Like the above-mentioned L-shaped angles 14, the pins 15 are arranged at the bent traces of the nails 7 in which a portion of the side surface of the vessel 6 is cut away in such a manner to be in contact with the lower surface of the base plate 3 at a desired space. Alternatively, the pins 15 do always not require to pass through the sidewall of the chassis unit 8, but they may be fixed to the inner sidewall of the chassis unit 8.

Since the supporting members are made from the pins 15 as described above, the pins 15 endure a load applied to the vessel 6 when the liquid crystal monitor is dropped, a deflecting deformation at the center of the side of the liquid crystal module 1 can be prevented, to thereby assure a



good quality of the product. Also, the pins 15 permit a simple structure and mounting and are capable of easily functioning as supporting members.

Furthermore, the support member may be made by cut-away bends 16 formed by cutting away a portion of the sidewall of the chassis unit 8 capable of supporting the vessel 6 from the lower portion thereof and bending it toward the inner side thereof.

Like the L-shaped angles 14 and the pins 15, the cut-away bends 16 are arranged at the bent traces of the nails 7 in which a portion of the side surface of the vessel 6 is cut away in such a manner to have a desired space, and the upper edges of the cut-away bends 16 are in contact with the lower surface of the base plate 3 when the integrated structure of the vessel 6 and the liquid crystal module 1 is fixed to the chassis unit 8.

Accordingly, since the cut-away bends 16 endure a load applied to the vessel 6 when the liquid crystal monitor having the liquid crystal module 1 fixed to the chassis unit 8 is dropped, a deflecting deformation at the center of the side of the liquid crystal module 1 can be prevented, to thereby assure a good quality of the product.

In addition, the cut-away bends 16 can be formed by a treatment of the chassis unit 8, so that it is possible to obtain a simple structure and avoid an increase in the number of components. Thus, a cost rise of the product can be prevented.

the liquid crystal module frame and the liquid crystal module is supported by the supporting member provided at the substantial center portion of the sidewall of the chassis.

As a result, the substantial center portion of the integrated structure of the liquid crystal module frame and the liquid crystal module is reinforced, so that a deflecting deformation at the center portion of the side of the liquid crystal module can be prevented when the liquid crystal monitor having the liquid crystal module fixed to the chassis is dropped, thereby assuring a good quality of the product.

As described above, in a mounting structure for the liquid crystal module according to claim 2, the supporting member in the mounting structure for the liquid crystal module set forth in claim 1 includes a screw member inserted, via the sidewall of the chassis, into the liquid crystal module frame.

Accordingly, the substantial center portion of the integrated structure of the liquid crystal module frame and the liquid crystal module is supported and fixed by the screw member inserted, via the sidewall of the chassis, into the liquid crystal module frame.

As a result, the integrated structure of the liquid crystal module frame and the liquid crystal module can be certainly fixed to the chassis, so that a deflecting deformation at the center portion of the side of the liquid crystal

Meanwhile, although the supporting members provided at the side surface of the longitudinal side of the vessel 6 has been described in all of the above-mentioned embodiments, but they are not limited to such supporting members. For instance, the supporting members may be provided at the short side because a deflecting deformation may be generated at the short side of the vessel 6.

Also, it is unnecessary to provide the supporting members at all of the longitudinal side and the short side of the vessel 6. In consideration of deformed locations caused by a dropping of the liquid crystal monitor, the supporting members may be provided only at the portions capable of obtaining an effect against the deformation.

## **EFFECT OF THE INVENTION**

As described above, in a mounting structure for a liquid crystal module according to claim 1, a supporting member for supporting the liquid crystal module supported by the liquid crystal module frame is provided at the substantial center portion of the sidewall of the chassis.

Accordingly, the integrated structure of the liquid crystal module having the LCD panel and the liquid crystal module frame is fixed by the receivers provided at four corners of the inner sidewall of the box-shaped chassis, and the substantial center portion of the side of the integrated structure of

module can be prevented when the liquid crystal monitor having the liquid crystal module fixed to the chassis unit is dropped, thereby assuring a good quality of the product.

As described above, in a mounting structure for the liquid crystal module according to claim 3, the supporting member in the mounting structure for the liquid crystal module set forth in claim 1 includes a receiving member provided to be supported and fixed to the inner sidewall of the chassis capable of supporting the liquid crystal module frame from the lower portion thereof.

Accordingly, the substantial center portion of the side in the integrated structure of the liquid crystal module frame and the liquid crystal module is supported from the lower portion of the liquid crystal module frame by the receiving member provided to be supported and fixed to the inner sidewall of the chassis.

As a result, the supporting member permits a simple structure. Also, a deflecting deformation at the center portion of the side of the liquid crystal module can be prevented when the liquid crystal monitor having the liquid crystal module fixed to the chassis unit is dropped, thereby assuring a good quality of the product.

As described above, in a mounting structure for the liquid crystal module according to claim 4, the supporting member in the mounting structure for

the liquid crystal module set forth in claim 1 includes an inner protrusion member provided to be supported and fixed to the inner sidewall of the chassis capable of supporting the liquid crystal module frame from the lower portion thereof.

Accordingly, the substantial center portion of the side in the integrated structure of the liquid crystal module frame and the liquid crystal module is supported from the lower portion of the liquid crystal module frame by the inner protrusion member provided to be supported and fixed to the inner sidewall of the chassis.

As a result, the supporting member permits a simple structure. Also, a deflecting deformation at the center portion of the side of the liquid crystal module can be prevented when the liquid crystal monitor having the liquid crystal module fixed to the chassis unit is dropped, thereby assuring a good quality of the product.

As described above, in a mounting structure for the liquid crystal module according to claim 5, the supporting member in the mounting structure for the liquid crystal module set forth in claim 1 includes a cut-away bending member made by cutting away a portion of the sidewall of the chassis capable of supporting the liquid crystal module frame from the lower portion thereof and bending it toward the inner side thereof.

Accordingly, the substantial center portion of the side in the integrated

structure of the liquid crystal module frame and the liquid crystal module is supported from the lower portion of the liquid crystal module frame by the cut-away bending member formed by cutting away a portion of the sidewall of the chassis and bending it toward the inner side thereof.

As a result, a deflecting deformation at the center portion of the side of the liquid crystal module can be prevented when the liquid crystal monitor having the liquid crystal module fixed to the chassis unit is dropped, thereby assuring a good quality of the product.

In addition, the cut-away bending member can be formed by a treatment of the chassis, so that it is possible to avoid an increase in the number of components. Thus, a cost rise of the product can be prevented.

## **5. BRIEF DESCRIPTION OF THE DRAWING**

Fig. 1 is an exploded perspective view showing a mounting structure for a liquid crystal module according to an embodiment of the present invention;

Fig. 2 is a detailed section view of a structure in which the substantial center portion of a vessel of the liquid crystal module is fixed to a chassis unit;

Fig. 3 is a partially cut-away schematic view of the liquid crystal module structure;

Fig. 4 is views for explaining an integration process of the liquid crystal module with the vessel, wherein (a) represents a state in which the liquid

crystal module is inserted into the inner side of the vessel, and (b) does a state in which the nails of the side surface of the vessel is bent toward the inner side thereof to be integrally fixed to the liquid crystal module;

Fig. 5 is an exploded perspective view showing a mounting structure for a liquid crystal module wherein a liquid crystal module is supported by a supporting member formed from L-shaped angles;

Fig. 6 is an exploded perspective view showing a mounting structure for a liquid crystal module wherein a liquid crystal module is supported by a supporting member formed from pins;

Fig. 7 is an exploded perspective view showing a mounting structure for a liquid crystal module wherein a liquid crystal module is supported by a supporting member formed from cut-away bends of a chassis unit; and

Fig. 8 is is an exploded perspective view showing a mounting structure for a liquid crystal module in the prior art.

## LEGEND

- 1 ...liquid crystal module
- 2 ...liquid crystal display (LCD) panel
- 6 ...vessel (or liquid crystal module frame)
- 8 ...chassis unit (or chassis)
- 9 ...receiver
- 11 ...screw (supporting member or screw member)
- 14 ...L-shaped angle (supporting member or receiving member)
- 15 ...pin (supporting member or inner protrusion member)